

CONVERSION PAD WITH MOISTURE BARRIER

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Field Of The Invention

The present invention relates generally to sanding tools and, more particularly, to a conversion pad for a sanding tool, such as an edger sander or random orbit sander, that resists warping.

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Background Of The Invention

When using a power sanding tool, such as an edger sander or random orbit sander, an abrasive article, such as an abrasive disc or sheet, is attached to the back-up pad of the tool. During sanding, the operator may be required to frequently replace a worn abrasive article or change from one abrasive article to another depending on the finishing step. In the past, to change from an abrasive article having one attachment system to an abrasive article having another attachment system (e.g. changing from an abrasive article having a hook and loop attachment system to one having a PSA attachment system), it was necessary to change the back-up pad itself because a back-up pad designed for one attachment system generally does not securely attach an abrasive article designed for a different attachment system.

To eliminate the need to change back-up pads when changing abrasive articles with different attachment systems, conversion pads were developed. Conversion pads typically have a backing formed of a durable material that has one surface for mating with the back-up pad and one surface including a mating surface for attachment with the abrasive article. An exemplary conversion pad is the 3M™ Stikit™ conversion pad available from 3M Company, St. Paul, MN. Many materials used for conversion pads, however, are susceptible to warping in wet or high humidity environments, or in low humidity environments. That is, a conversion pad that is generally planar when manufactured may warp in one direction when exposed relatively moister conditions,

and may warp in the opposite direction when exposed to relatively drier conditions. A warped conversion pad can interfere with the sanding operation by producing inconsistent or uneven sanding of the work surface.

5 Summary Of The Invention

As a result, the needs exists for an affordable conversion pad with improved sanding characteristics. In particular, the need exists for a conversion pad that resists warping in either high moisture (i.e. wet or high humidity environments) and in low moisture (i.e. low humidity) environments. It would therefore be desirable to provide
10 a conversion pad that is easy to manufacture and has improved warp resistance in both high and low moisture environments.

The invention overcomes the above-identified limitations in the field by providing a conversion pad for attaching an abrasive article to a sanding tool including a supporting layer comprising a backing material and a moisture barrier arranged on at
15 least a portion of the supporting layer, thereby to protect the backing material from water and moisture, and a layer of attachment material affixed to the supporting layer for attaching the abrasive article to the conversion pad. In a particular embodiment, the backing comprises a vulcanized fiber material.

In another aspect, the present invention provides a conversion pad including a
20 supporting layer comprising a backing attached to a layer of attachment material for attachment with an abrasive article, wherein the backing comprises vulcanized fiber material. In a particular embodiment, the supporting layer includes a moisture barrier is arranged on at least a portion of the backing.

In one embodiment, the backing material is interposed between a pair of
25 moisture barrier layers. The moisture barrier layers may comprise polyurethane, wax, epoxy, polypropylene, polyethylene terephthalate, polyvinyl butyral, polyethylene, latex, acrylic, enamel, or tar, or combinations thereof.

In one embodiment, the layer of attachment material comprises a layer of nylon hook-type fastening elements. In another embodiment, the layer of hook-type fasteners is affixed to the backing layer with a heat resistant nylon hot melt adhesive.

5 In another embodiment, the supporting layer is adhesively bonded with the attachment material with a heat resistant nylon hot melt adhesive.

In this application:

“Moisture resistant” refers to the ability to create a barrier that reduces the amount of moisture that can pass through the barrier to a sufficiently low level to prevent the underlying material from being adversely affected by an increase or decrease in

10 moisture for a given set of environmental conditions typically encountered during the shipping and storage of a product.

“Moisture proof” refers to the ability to create a barrier that completely blocks moisture from passing through the barrier for the life of a product for a given set of environmental conditions typically encountered during the shipping, and storage of the 15 product.

Generally, the moisture resistant and moisture proof layers adequately protect the conversion pad backing to prevent the backing, and consequently, the conversion pad itself, from warping to the point where the warping would interfere with the sanding operation. In other words, the moisture resistant and moisture proof layers

20 protect against warping that can be caused by increases or decreases in moisture. This is accomplished by preventing the backing from being exposed to an increase or decrease in moisture that could cause warping to the point where the sanding performance of the conversion pad is adversely affected by the warping.

An advantage of certain embodiments of the present invention is that it minimizes the effect that moisture can have on the conversion pad, and more particularly, the conversion pad resists warping that may be caused by exposure to high or low levels of humidity. Another advantage of certain embodiments of the invention is that the use of nylon materials and hot melt adhesive adds resistance to heat generated during the sanding operation of wood floors and coatings applied

thereto. An advantage of other embodiments is that the use of a conversion pad including a 30 mil vulcanized fiber backing improves the fatigue strength of the conversion pad, and thereby provides resistance to rotational spin induced failure during the sanding operation.

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Brief Description Of The Drawing

The present invention will be further described with reference to the accompanying drawing, in which:

Fig. 1 is a sectional view of a conversion pad according to the invention.

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Detailed Description

Referring now to the drawing, Fig. 1 shows a conversion pad 2 including a composite supporting layer 4 affixed to a layer of attachment material 6.

In accordance with a characterizing feature of the invention, the composite supporting layer 4 includes a layer of backing material 8 interposed between two protective layers 10,12 that create a moisture barrier that serves to protect the backing material 8 from the deleterious effects of moisture whether in the form of water or high or low humidity. An exemplary material for the backing layer 8 is a vulcanized fiber material. A suitable vulcanized fiber material is 30 mil thickness vulcanized fiber board available from 3M Company, St. Paul, MN under raw material number RM 11-0021-0373-4.

The protective layers 10,12 may be either moisture resistant or moisture proof so long as they provide adequate protection against water and moisture to prevent the backing material 8 from warping to the point where the warping interferes with the desired performance of the conversion pad. Suitable materials for the protective layers 10,12 include polyurethane, wax, epoxy, polypropylene, polyethylene terephthalate, polyvinyl butyral, polyethylene, latex, acrylics, enamel, and tar. A particularly suitable material for the protective layers 10,12 is PU-40, a polyurethane dispersion containing 40% solids available from Illbruck, Inc., Minneapolis, MN.

In the illustrated embodiment, protective layers 10,12 are provided on both the first 16 and second 18 surfaces of the backing 8. It will be recognized, however, that the protective layers 10,12 may be provided on only one, on both surfaces, and/or along the edge 20 of the backing 8, so long as the protective layer or layers provides

5 adequate protection against water and moisture for a given set of conditions, thereby to reduce the degree of bowing or warping of the conversion pad to the point that desired performance of the conversion pad is achieved. That is, some slight bowing or warping is acceptable, but only to the point where the bowing or warping does not interfere with the sanding operation.

10 In the illustrated embodiment, the protective layers 10,12 are provided on both major surfaces 16,18 to create a balanced backing 8, thereby minimizing the likelihood of bowing and warping. It will also be recognized that the protective layers 10,12 may themselves include one or more layers. For example, the protective layers 10,12 may include a sealer or primer followed by a basecoat and an optional topcoat.

15 The composite supporting layer 4 is adhesively bonded to the layer of attachment material 6 with a suitable adhesive 14 such as a hot melt adhesive. The hot melt adhesive is preferably a heat resistant adhesive such as a nylon hot melt adhesive. A suitable heat resistant nylon hot melt adhesive is available from 3M Company, St. Paul, MN under the product designation HM-114-50.

20 The conversion pad 2 includes a first major surface 22 that attaches to an abrasive article (not shown) and an opposed second major surface 24 that engages a back-up pad (not shown). The first major surface 22 includes a plurality of hook-type fastening elements 26 that mate with a loop-type surface provided on the abrasive article. When secured to the back-up pad, the conversion pad 2 provides the back-up pad with a new mating surface, namely surface 22, that can be used to attach the abrasive article to the back-up pad.

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In order that the invention described herein can be more fully understood, the following example is set forth. It should be understood that the example is for

illustrative purposes only, and is not to be construed as limiting this invention in any manner.

EXAMPLE

5 A conversion pad having the construction shown in Fig. 1 was prepared as follows. A 30 mil thick vulcanized fiber backing available from 3M Company, St. Paul, MN was coated on both major surfaces with PU-40 polyurethane available from Illbruck, Inc., Minneapolis, MN, thereby creating barrier layers that protected the backing from water and moisture. The coated backing was then affixed to an
10 attachment member having a plurality of J style hooks using 3M Company hot melt adhesive HM 115-50, a heat resistant nylon hot melt adhesive.

The warping characteristics of the conversion pad were evaluated by storing it together with a similar conversion pad that did not include the protective polyurethane coating layers for the same amount of time and under the same temperature and
15 humidity conditions. The conversion pad of the invention was found to undergo significantly less warping than the conversion pad that did not include the protective polyurethane coating when exposed to variable humidity conditions.

It will be apparent to those of ordinary skill in the art that various changes and modifications may be made without deviating from the inventive concept set forth
20 above. Thus, the scope of the present invention should not be limited to the structures described in this application, but only by the structures described by the language of the claims and the equivalents of those structures.